KECHIKA WOLF PROJECT

1982-83 Annual Progress Report

by

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PREFACE

This is the second annual report of the Kechika Wolf Project, covering the period 1981-82. Since it treats only part of a continuing study, interpretations are tentative; reference to the contents of this report in other scientific papers should not be made without the prior permission of the British Columbia Ministry of Environment, Fish and Wildlife Branch, Parliament Buildings, Victoria.

ABSTRACT

This report presents results of the second year's progress on the Kechika Wolf Project, part of a larger project designed to enhance ungulate numbers in the Kechika area. Population statistics for moose from 1982-83 in the non-removal area suggest that moose could be declining by 50% every three years. In the wolf removal area, moose numbers could double in six years if present conditions and existing population parameters are maintained. In Alaska, where larger areas receive wolf control, moose numbers may double in 3-4 years. For mountain sheep except in the wolf removal area the second consecutive winter with low recruitment was recorded, probably due to the severe condition of the 1981-82 winter (in addition to wolf predation). However, a strong wolf effect was still apparent in the wolf removal area, which had proportionally twice as many lambs and three times as many yearlings as the non-removal area where wolf densities were high. Since 1975, the mountain sheep population in the northeast zone has declined by an estimated 9,000 animals. The timetable for range enhancement by prescribed fire has been re-scheduled, pending further discussion.

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1. INTRODUCTION

1.1 Background

Major declines of wild ungulate populations are evident in several areas of northern B.C. The key indicator identified in the declines is widespread low recruitment of younger age-classes relative to mortality of other age-classes. (Recruitment is defined as the portion of a population of a given age or older, for one or both sexes - which that given age group comprises). This low recruitment appears to result from an interaction of food supply, predation, and weather.

This report presents progress of a study in the Kechika River area, where wolves are being reduced in order to clarify their effect on moose and mountain sheep populations. The study areas and methods are described in the working plan (Elliott 1982) and in Elliott and Webster (1982). Progress in the first year was reported in Ellott and Webster (1982).

1.2 Experimental Design

The original Kechika project design looked at identifying the effects of predation and habitat status on Stone's sheep and moose through dividing the study area into eight units (moose or mountain sheep versus enhanced range or unenhanced range versus high wolf densities or low wolf densities.

This design has been modified for two reasons. First, although some range enhancement through burning occurred for mountain sheep; the burning program in the Kechika was terminated by the Ministry of Forests. Thus, the effect of range could not therefore be incorporated directly. Second, rate of the immigration by wolves into the low wolf area was so high. Thus, it was not practical with one time reduction to achieve low wolf numbers for any duration. Work elsewhere also identified this problem with 6,000 to 10,000 square miles being considered the smallest practical unit (Gasaway et al. 1983). In consequence for 1984 wolves will be reduced for the entire study area, plus extension up some of the side drainages.

2.0 RESULTS AND DISCUSSION

2.1 Wolf Survey and Reduction

The 1981-82 program is described in the previous annual report. A total of 153 wolves was estimated to utilize the project area with an average density of one wolf per 25 square miles. Nine packs for a total of 71 wolves were encountered (out of 88) in 1982 in the reduction treatment area; 70 of these were removed.

Figure 1 and Table 1 summarize the 1983 wolf numbers and wolf removal level. Seventeen packs and five singles were encountered for a total of 95 wolves in 1983 in the reduction area; 89 of these were removed. The small reduction area

Table 1. Wolf status in Kechika area - February/March 1983.

Feature	Untreated area	Treatment area	
		pre-removal	post-removal
Area (sq. mi.)	1050	2750	2750
No. packs	8 + 2 singles	21 + 5 singles	5 + 4 singles
No. wolves	57	107	18
Sq. mi./pack	131	130	550
Density (sq. mi./wolf)	18	26	153
Pack size	6.9	4.9	2.8

was not conducive to achieving greatly lowered wolf densities for even twelve months. Experience from the Horseranch range (Elliott et al. 1983) suggests post-reduction wolf densities probably remain reasonably intact over summer with most of the increase thereafter. Assumedly, the population rebound in the reduction area results partially from reproduction within the area; for example, the 1982 pack of seven utilizing the lower Hornline and which was not removed, had increased to fourteen by November, and split into two packs (nine and five)

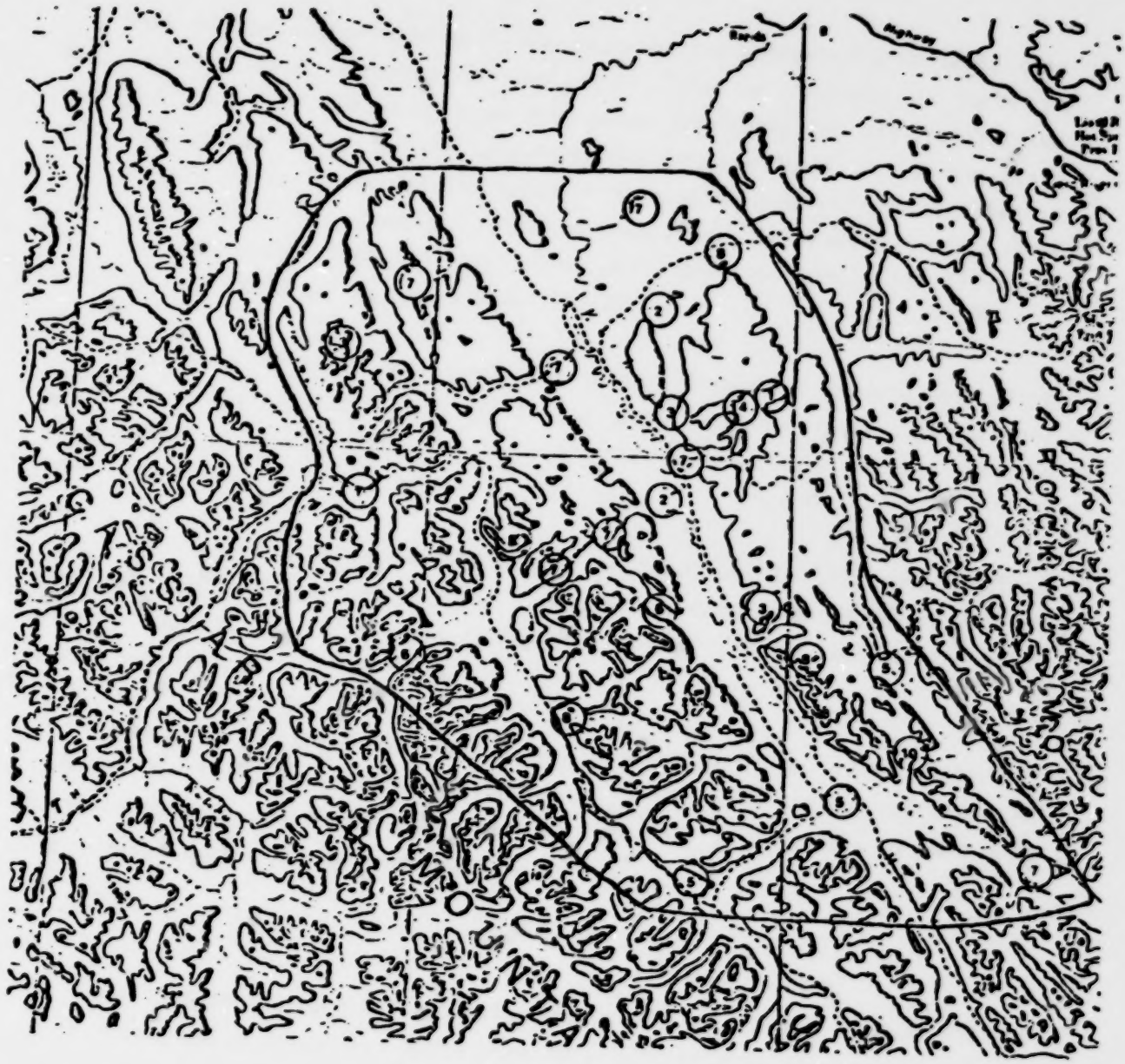

Fig. 1. 1983 Pretreatment
Wolf Pack Sizes

by late winter. Most of the rebound however is presumably the result of external reproduction and immigration.

Most of the increase in wolf densities in the untreated area (1983 over 1982) results from increases in pack sizes, plus an increase in packs in northwest corner of the study - an area which previously had artificially low wolf numbers due to an earlier wolf reduction program there and to the west. Wolf numbers in northeast British Columbia have shown generally an increase in 1983 over 1982. For example in the northeast elk enhancement project area (Elliott and Webster 1982; Elliott 1983b) wolf densities were 1 per 13 square miles in 1982 and 1 per 25 square miles in 1983.

Fifty-seven (60%) of the ninety-five wolves encountered in 1983 were black while the remaining thirty-eight (40%) were gray. This contrasts to 19 percent black wolves in 1982. It has been theorized that black animals are more prone to invade new areas.

Thirty-three (47%) of seventy wolves of known sex in 1983 were females. This compares to 49 percent in 1982. Fifty-six percent of the 1983 gray wolves were female (52% in 1982), while thirty-nine percent (36% in 1982) of the black wolves were female.

Twenty-one of sixty-three aged wolves were young of the year. Reduction occurred earlier (three weeks) in 1983 than in 1982 and it did not prove as suitable to determine reproduction status. However, no instances of more than one pregnant female per pack were encountered.

2.2 Moose Surveys

Obtaining an unbiased estimate of newborn calf recruitment in June did not prove economically practical; moose were very difficult to see at that time of year in many habitats, and it was felt unrealistic to assume equal visibility for cows with newborn calves and those without. It can be however probably be that the biases would be equal in the reduced wolf and high wolf areas; Table 2 presents the results of spring surveys.

Table 2. Proportion of calf to cow moose seen on 7 and 8 June, 1982, for high and reduced wolf areas.

Area	Number of Cows	Number of Calves*	Total
High wolf	50	16 (24%)	66
Reduced wolf	59	21 (26%)	80
Total	109	37 (25%)	146

Chi square = 0.077 0.90 > P. of similarity > 0.75

* Percent of calves of total counted.

It can be seen that the two areas do not differ in spring calf proportions. The relatively low calf proportion in each area (and, as will be shown, the slight increase in calf proportions seen in the fall for the reduced wolf area) suggest that cows with calves are harder to see than those without.

By fall, differences in calf survival were apparent (Table 3). (Leaves were absent and the ground was snow covered at that time making for good search conditions.)

Table 3. Moose population composition 17 and 18 November, 1982 for high and reduced wolf areas.

	Number				
Area	Cows	Calves	Yearling Males	Older Males	Total
High wolf	86	12	8	59	165
Reduced wolf	147	49	8	59	263
Total	233	61	16	118	428

Chi square (calves to cows) = 6.464
0.025 > P. of similarity (calves to cows) > 0.010

In the high wolf density area, the calf:100 cow ratio was 14, while the reduced wolf density area had 33. A comparison of the calf/cow proportions determined from the preceeding late winter survey (corrected with the sex ratio from this autumn survey) and assuming a 50:50 sex ratio in yearlings suggests little selective oversummer loss of yearlings relative to cows. Gasaway et al. (1983) likewise found summer losses to be concentrated on calves.

The digression between calf proportions in the high wolf and reduced wolf areas became greater by late winter (Table 4). There area now only eleven calves

Table 4. Moose population composition February - March, 1983 for high and reduced wolf areas.

Area	Cows	Calves	Bulls	Total
High wolf	83	9	62	154
Reduced wolf	135	42	71	248
Total	218	51	133	402

Chi square (calves to cows) = 7.663
0.010 > P. of similarity (calves to cows) > 0.005

per one hundred cows in the high wolf area versus thirty-one in the reduced wolf area. This comparison however underestimates the role of wolf predation. It was found for Alaska (Gasaway et al. 1983) that for moderate wolf density areas, cows over two years of age died over winter at almost two-fifths the rate of young of the year; while for low wolf densities, it was about one-eighth that of young of the year. It is difficult to apply these ratios to the Kechika particularly when the timing of the influx of wolves into the reduced wolf area is uncertain. However, to conservatively estimate the role of predation, let us assume that adult mortality is two-fifths that of juveniles in the winter. Given the few

juveniles available (relative to Alaska) this should underestimate adult mortality in high wolf areas; conversely it should overestimate adult mortality in low wolf areas. As noted, these assumptions will yield a conservative estimate of the role of predation. A quick calculation based on this assumption plus the data of Tables 4 and 5 yields a 43 percent loss of calves from autumn until late winter in the high wolf area. The Alaskan work found wolf predation on adult moose to be mostly a winter activity; if this period of predation is assumed five months in duration then cow mortality would be conservatively 25 percent per year. At those rates of mortality and with 5% recruitment the female portion of the herd can be expected to decline by half every three years with comparable reduction in bulls.

A similar calculation can be undertaken for the reduced wolf area: 10.5 percent of the calves are estimated lost between autumn and late winter, with annual cow mortality being 6 percent and recruitment 21%. Thus the female portion of the herd can be expected to double every five to six years. Larger area wolf reduction in Alaska resulted in herd doubling every three to four years. Table 5 summarizes the moose statuses based on the conservative assumptions given. Subtleties such as different age distributions, weather, changes in wolf functional and numerical responses as moose decline in high wolf zone, density dependent responses as moose increase in reduced wolf zone, will of course modify herd growth. It is apparent however, that the moose in the reduced wolf area now appear to be a substantially more viable population where prior to the wolf reduction they were even poorer than the 1983 high wolf areas. Further this improved status appears to have been the result of the reduction in wolf numbers.

Table 5. Moose herd status in the two Kechika zones.

Zone	Percent Calf Mortality November to February - March	Percent Annual Cow Mortality	Herd Trend
High wolf density	43.3	25	halving every three years
Reduced wolf density	10.5	6	doubling every five to six years

The rate of moose decline in the normal high wolf area is probably accelerating. This would be expected where moose are becoming less dense and wolves more dense. Thus while direct extrapolation would suggest an approximately 80% decline in the past ten years the true decline is probably no more than 2/3. This figure would better match the author's impression of the level of decline.

Some problems were encountered with the Forest Service in proceeding with the ten year Kechika range enhancement program. In consequence this aspect of the project has had to be dropped for moose (and possibly in the future for mountain sheep).

Twice as many lambs and three times as many yearlings per ewe were found overall for the reduced wolf versus the high wolf area. The results of the late winter sheep surveys are given in Table 7. There are six discrete combinations of treatments since those units receiving some range enhancement in 1981 must be separated from those receiving some range enhancement in 1982. Unfortunately the treatments are not uniform which confounds interpretation of Table 11. Firstly, the 1981 burns in the high wolf area were in lighter fuel than those in the reduced wolf area or the 1982 burns. These can be expected to have a lesser effect especially after the first year of burning. Secondly the lowest wolf use area identified (prereduction 1983) corresponded with the reduced wolf unburned ara. Regardless there is a definite pattern emerged relative to predation.

1982 - 1983 is the second consecutive winter with low mountain sheep recruitment (other than the reduced wolf area). It was speculated (Elliott and Webster, 1982b) that the high snowpack and late spring during the 1981 - 1982 winter was responsible (through reduced nutrition and high predation vulnerability) for the low recruitment that winter. Elliott et al. (1984) found for caribou that long harsh winters resulted in a marked reduction in viable calf production the following spring. The data of Table 7 would suggest that a similar phenomenon operates for Stone's sheep and accounts for the relatively low values found. It would appear that, as for caribou (Elliott et al. op.cit.), substantial population benefits from wolf reduction will best be achieved after winters of average or below average severity.

Table 7. Response of mountain sheep to differing treatments and predation.

Range	Predation							
	Reduced Wolf				High Wolf			
	ewes	lambs	yearlings	sample size	ewes	lambs	yearlings	sample size
Some burned, 1981	100	35.5	12.9	298	100	17.7	5.1	215
Some burned, 1982	100	36.2	4.3	97	100	31.2	3.1	86
Unburned	100	50.1	13.0	244	100	13.7	2.1	110
All	100	41.0	11.6	639	100	19.2	3.9	411

High wolf versus reduced wolf:
Chi square (lambs to ewes = 22.20; P of similarity < 0.005
Chi square (yearlings to ewes) = 12.80; P. of similarity < 0.005

Table 8 (from Elliott, in prep.) summarizes adult ewe numbers (two plus years of age) for nonoverlapping unit groupings in the northeast for different years with calculations of population growth rates. The 1983 counts include approximately one-third of the ewes in the northeast and appear to be representative of the remainder. Since 1975 when the decline began to gain momentum it is estimated (by extrapolation from Table 8) that the Stone's sheep population in the northeast of British Columbia has declined by over 9,000 sheep to the present estimated 7,000).

Table 8. Population declines in Stone's sheep in Northeast British Columbia.

Number of Ewes for that year			Range	Percent Decline	Annual Percent Decline
1977	1981	1983			
	527	433	Unenhanced	18	9
418		218	Unenhanced	48	10
195		138	Enhanced	29	6

During the period of 9 to 10 percent annual decline, yearling female recruitment has been 7 percent (Elliott and Webster, 1982b) on unenhanced (that is most) ranges. It follows that adult ewe mortality must have averaged 16 to 17 percent annually. On enhanced (by fire) ranges yearling female recruitment has averaged about 11 percent (Elliott and Webster, op.cit.). It follows then that the adult ewe mortality remains the same on the enhanced ranges (in the presence of normal high wolf numbers). It is however anticipated that ewe mortality will decline as wolf numbers are reduced. This aspect will be clarified by the Kechika project.

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